# BAT SURVEY REPORT

BAT SURVEY

ARCADIS LLP

BEAN TUNNEL, KENT (ARCADIS)

BLUEWATER, KENT

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LLOYDBORE LTD
33 ST GEORGE'S PLACE
CANTERBURY, KENT, CT1 1UT
t: 01227 464340

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| | |
|---|---|
| Author | Laragh Smyth BSc (Hons) |
| Reviewed by | Jaimé Turner BSc (Hons) |
| Checked and approved by | Philip Ames BSc (Hons) MCIEEM |

## EXECUTIVE SUMMARY

S.1 Lloydbore Ltd were commissioned on behalf of Arcadis to undertake update bat surveys of three tunnels situated at Bean Road tunnels, Bluewater retail park, Kent.

S.2 Bat autumn swarming surveys were conducted on 31st October and 6th November 2023. Subsequent to this, winter hibernation surveys were completed from December 2023 to late February 2024 and summer emergence surveys were carried out from May to late June 2024.

S.3 No evidence of swarming was recorded during the autumn swarming surveys. Static monitoring recorded a large number of pipistrelle passes in November 2023 which may indicate swarming by this species. Common pipistrelle, soprano pipistrelle, brown long-eared bat and myotis species (likely Daubenton's bat and another unidentified myotis) were recorded during the monitoring survey.

S.4 All three tunnels were found to have some bat use as a hibernation site, with tunnel 3 having one bat on one occasion. Four species of bat have been recorded hibernating in the tunnels; Common pipistrelle, Soprano pipistrelle, brown long-eared bat, Natterer's bat were recorded hibernating across the three tunnels. A peak count of eight individual bats were recorded on any one visit across the three tunnels, though more may have gone undetected.

S.5 All three tunnels together provide a choice of differing conditions of use to hibernating bats and should be seen as being used in conjunction with each other as one site. Given the numbers of bats and range of species, the tunnels should be seen as being of high conservation significance of at least county importance.

S.6 Summer roosting was recorded in Tunnel 1 by three brown long-eared bats. More summer roosting bats may have gone undetected. Tunnel 1 and 2 were used by bats for foraging, socialising and grooming with 10 individual bats recorded using Tunnel 1 at a single point.

S.7 Overall, across the whole survey period, up to 6 species of bat have been recorded using the three tunnels; common pipistrelle, soprano pipistrelle, brown long-eared bat, Natterer's bat, Daubenton's bat and another myotis species.

S.8 Any works affecting these tunnels will require a European Protected Species Mitigation Licence (EPSML). This licence will include timing for works to avoid disturbance to hibernating bats along with measures to mitigate for any damage or loss of roosting features. Replacement of features should be on a like-for-like basis to ensure the continued current conservation status of the specie of bats using the site.

S.9 Specific details relating to avoidance, mitigation, compensation and enhancement measures relating to roosting bats will not be included in this report and will instead be included as part of any EPSML and an Ecological Impact Assessment report which will need to cover these points.

# 1. INTRODUCTION

## INSTRUCTION

1.1 Lloydbore Ltd was instructed to undertake autumn swarming, winter hibernation survey and summer emergence survey of the three tunnels located off Bean road, Bluewater, Kent. The approximate centre of the survey area is TQ 5847 7336.

1.2 The surveys carry on from existing surveys previously conducted by ARUP in 2019 (Ove Arup & Partners ltd, 2019) where roosting hibernating bats were found using cavities around expansion bolts and similar cavities within the tunnel walls. As a result of these surveys, additional roosting features (both boxes and planks) were installed within each of the tunnels and on adjacent trees.

### *BACKGROUND DATA*

1.3 The previous survey of the site concluded that Tunnel 1 was used by low numbers of common pipistrelle bats (*Pipistrellus pipistrellus*) with a maximum of three bats encountered on one occasion in February 2019.

1.4 No bats were found to be using Tunnel 2 during the survey, although static monitoring of the tunnel returned bat echolocation and given the existing Potential Roosting Features (hereafter abbreviated to PRF), the presence of hibernating bats was not ruled out at the time.

1.5 No bats were recorded in Tunnel 3 (referred to as the conveyor tunnel), this was attributed to a lack of PRFs (Ove Arup & Partners ltd, 2019).

### *PROPOSALS*

1.6 The proposals for the site involve the creation of a new road access tunnel while retaining the existing three tunnels. Tunnel 2 would be used for pedestrian traffic and light machinery during the construction period.

1.7 Check to see if most recent proposals have changed from the creation of a new tunnel, closing of tunnel 2 and loss of open water and reedbed.

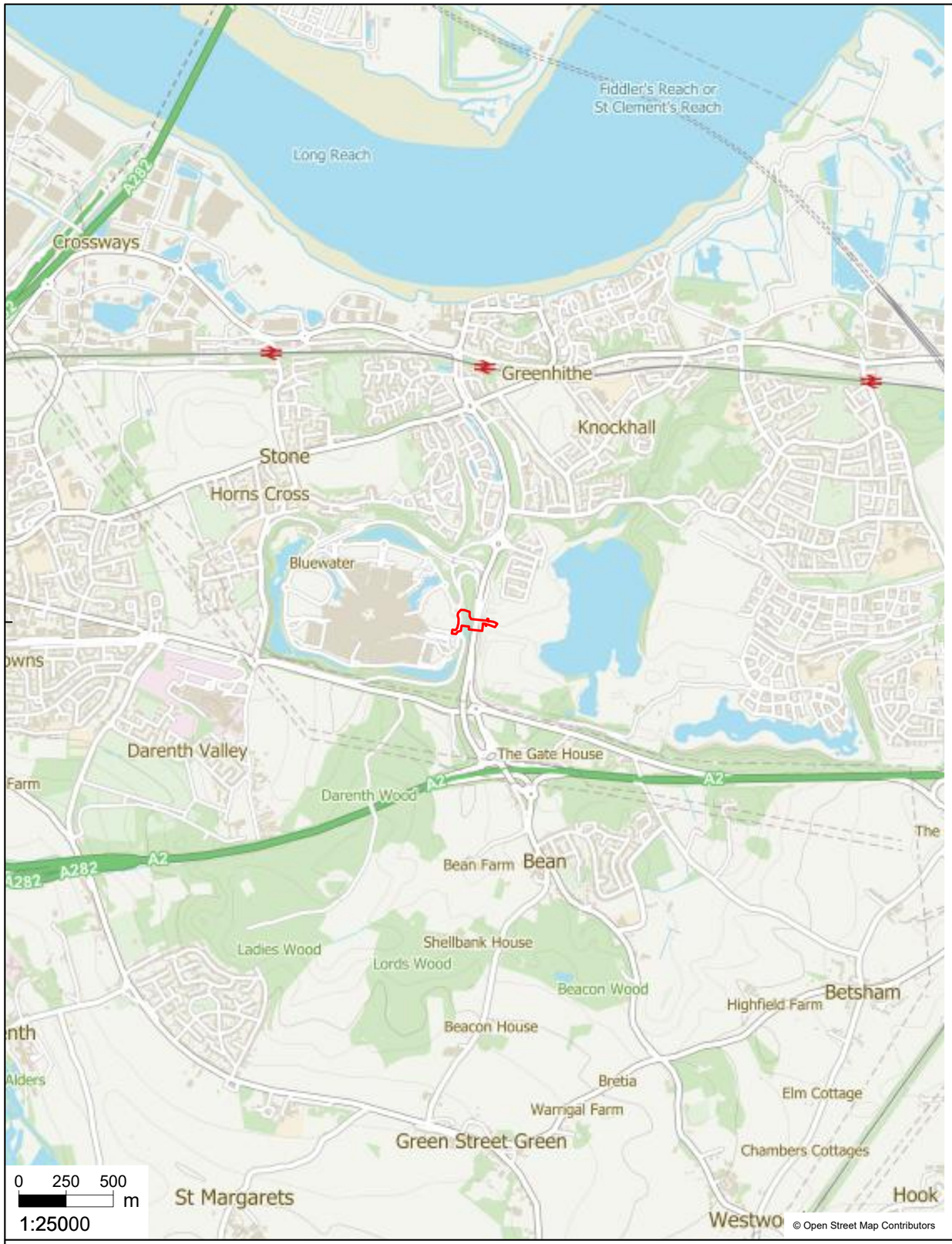
## SURVEY OBJECTIVES

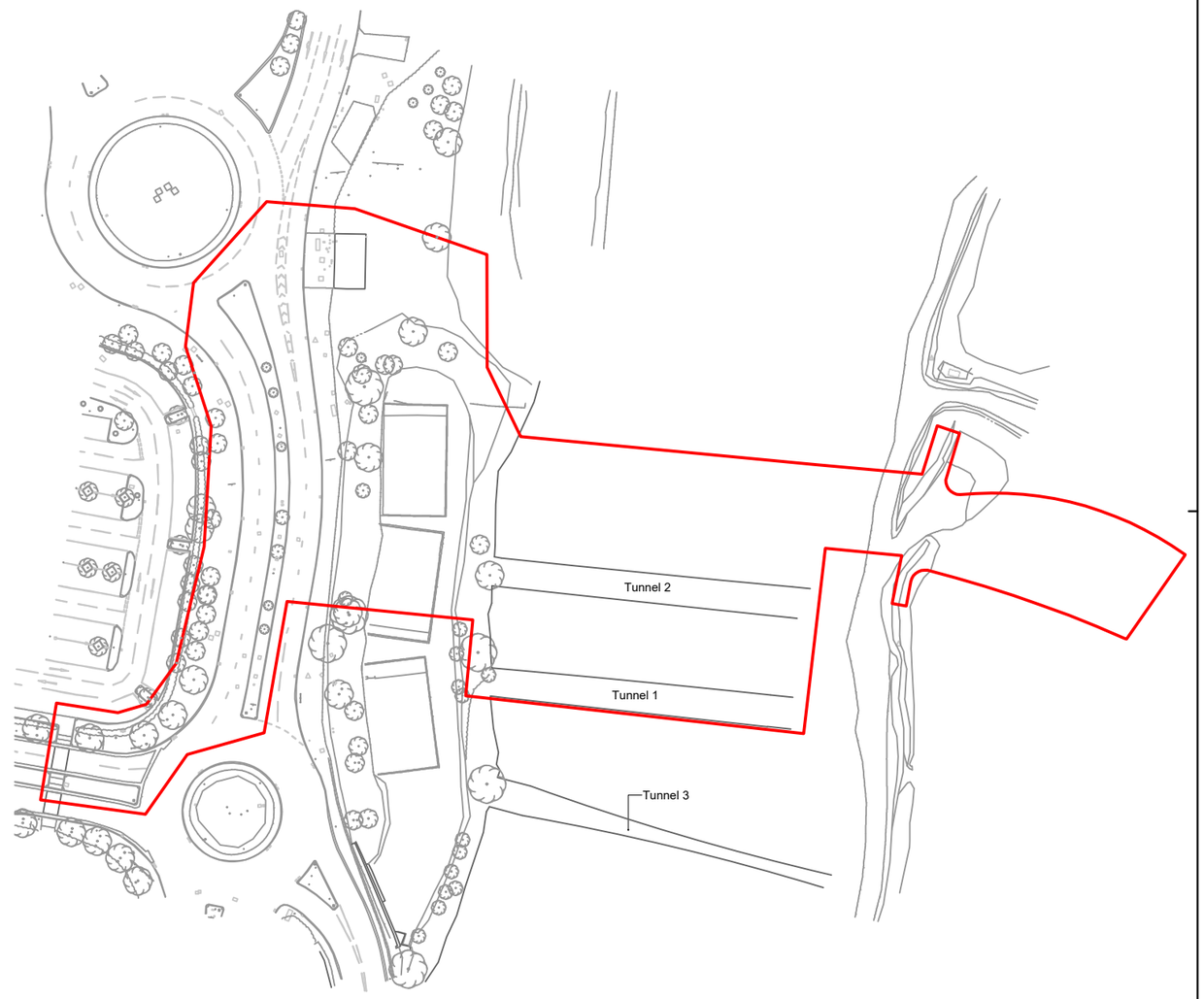
1.8 The objectives of the survey and report are to: -

- Identify the species and numbers of bats roosting within the internal or external features of the three tunnels throughout the year;
- Provide updated data on the use and distribution of bats within the tunnels to inform a EPSML which would be required to facilitate the development.
- Assess the ecological importance of the application site for roosting bats and, where appropriate and possible, provide information in relation to summer roosting and hibernation roosting.

## 2. SITE LOCATION

2.1 The *Site Location Plan*, overleaf, shows the location of the three tunnels as seen from a bird's eye view.




**LEGEND:**

Indicative site boundary

This drawing and design are the copyright of Lloyd Bore Ltd. Do not scale from this drawing. This drawing has been produced for the purposes of a planning application and is not intended for construction purposes. The information is subject to checking and written approval by the project engineer, particularly in respect of above and below ground services, structures and foundations.

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lloydbore landscape ecology arboriculture
33 ST. GEORGE'S PLACE, CANTERBURY, KENT CT1 1UT 01227464340
www.lloydbore.co.uk mail@lloydbore.co.uk

# 3. METHOD

## DESK STUDY

3.1 The Multi-Agency Geographic Information for the Countryside (MAGIC) website was used to identify approved bat EPSM licences located within 5km of the application site.

## PRELIMINARY ROOST ASSESSMENT

3.2 An internal inspection was carried out by Philip Ames and Laragh Smyth on 19th October 2023.

3.3 The inspection was undertaken during daylight and included an examination of the interiors of all three tunnels. Both high powered torches, close-focus binoculars and endoscope was used to look for evidence of bats. Evidence of bat presence could include: -

- Bats;
- Bat droppings;
- Signs of feeding; and
- Staining.

3.4 Attention was given to areas where bats might have access to potential roost sites, such as gaps cracks and crevices in the walls (accessible features outside and inside), around expansion bolts, behind boards and within bat boxes inside the tunnels.

3.5 Following the inspection, the tunnels were categorised according to their suitability for roosting bats. Factors considered in this assessment include: -

- The condition and layout of the tunnels;
- The materials used in the building construction;
- The presence of potential roosting features; and
- The surrounding habitat.

3.6 The categories used to determine bat roost suitability were adapted from guidance provided in *Bat Surveys for Professional Ecologists: Good Practice Guidelines (4th edition)* (BCT, 2023). The following categories were used: -

- 'Confirmed roost';
- 'High suitability' for roosting bats;
- 'Moderate suitability' for roosting bats;
- 'Low suitability' for roosting bats; and
- 'Negligible suitability' for roosting bats.

## HIBERNATION SURVEYS

3.7 An initial assessment was made in October to locate features and check conditions of the three tunnels as well as site access in preparation for the winter hibernation surveys.

3.8 Hibernation survey visits were completed on four occasions: 22nd December, 16th January, 6th February and 26th February.

3.9 The hibernation survey of the tunnels involved a systematic inspection of each side of the tunnel walls using a combination of high powered torches, head torches, endoscope, and close-focus binoculars.

3.10 Surveyors, working in pairs, would simultaneously search one wall before returning down the other, this ensured that each feature was inspected twice by experienced bat ecologists to maximise the chances of bats being detected.

3.11 Positions of bats were referenced against the position of bat boxes and boards installed within the tunnel, counting the number of bolts to pinpoint the position of any bats recorded during the survey.

3.12 As well as looking for the physical presence of bats, evidence of presence such as staining or droppings were also searched for.

## AUTUMN SWARMING AND SUMMER EMERGENCE SURVEY

3.13 During the surveys, five surveyors were positioned at vantage points near to the entrances and within the tunnels. These vantage points gave adequate visual coverage of the bat access / exit points.

3.14 Surveyors were equipped with a Batlogger M detector with built-in recording device.

3.15 BatExplorer software was used to verify species identifications when required or when identification was uncertain.

3.16 Each surveyor was equipped with an infra-red camera as a night vision aid (NVA).

3.17 NVAs increase precision during survey visits, particularly where there is potential for late-emerging species and in dark conditions and to help provide confirmation of bat emergence points or where 'possible' emergence was recorded (BCT, 2024).

3.18 Canon XA10 and Canon XF100 infra-red cameras (with additional infra-red spotlights or torches) were used during the three survey visits.

3.19 These NVAs were positioned facing the entrances to the tunnels so that entrance and exit from the tunnels could be recorded throughout the course of the survey visits. The NVAs were deployed at the beginning of the survey and set to record for the duration of the survey. Surveyors would switch to viewing the PRFs through the screen of their NVA once it became too dark to visibly see the features they were observing.

3.20 Where appropriate, NVAs were positioned unmanned. In these instances, the survey footage was subject to a full desk-based review after the survey visit.

3.21 When required, the infra-red footage was also reviewed after the survey using VLC media player at normal review speed or slower, to ensure that any bat emergences within the range of the cameras were identified and analysed or to provide additional information on egress / ingress locations and number of bats present within the structure.

3.22 Autumn swarming surveys, comprising of two dusk visits were undertaken in October and November 2023.

3.23 Summer emergence surveys, comprising of three dusk visits were undertaken in May and June 2024.

3.24 Table 1 provides details of the timings and weather conditions recorded during the surveys.

*Table 1 Survey details for the autumn swarming and summer emergence survey visits.*

| Date of survey visit | Survey type | Structure(s) surveyed | Start time | Finish time | Sunset | Surveyors | Weather at start and end |
|---|---|---|---|---|---|---|---|
| 31/10/2023 | Autumn swarming | Tunnels 1, 2, 3 | 17:55 | 20:00 | 16:34 | Laragh Smyth, Philip Ames, Nikki Stapleton, Jack Bage, Louise Gower | 14°C degrees, Wind 1-2, cloud 100%, light drizzle at 19:50. |
| 6/11/2023 | Autumn swarming | Tunnels 1, 2, 3 | 17:55 | 20:00 | 16:24 | Laragh Smyth, Philip Ames, Jack Bage, Jaime Turner, Davey Monk | 10°C - 8°C, Wind 1-2, cloud 20%, no rain. |
| 14/05/2024 | Summer emergence | Tunnels 1, 2, 3 | 20:28 | 22:13 | 20:43 | Laragh Smyth, Philip Ames, Jack Bage, Louise Gower, Jaime Turner | 16°C - 17°C, 80% cloud, Beaufort wind 1-2 (east-south-east), no rain. |
| 06/06/2024 | Summer emergence | Tunnels 1, 2, 3 | 20:54 | 22:41 | 21:11 | Laragh Smyth, Philip Ames, Lousie Gower, Unmanned x2 | 16°C - 15°C, 35% cloud, Beaufort wind 1 (south-south-west), no rain. |
| 27/06/2024 | Summer emergence | Tunnels 1, 2, 3 | 21:05 | 22:30 | 21:21 | Laragh Smyth, Philip Ames Unmanned x2 | 20°C- 19°C, 50% cloud, Beaufort wind 2 (west), no rain. |

## STATIC MONITORING

3.25 Static monitoring was undertaken at 10 day intervals between each of the three tunnels. This involved placing three Elekon Batlogger A+ detectors half-way down each of the tunnels (one in each tunnel) to record ambient bat activity during the winter hibernation period between 19th October 2023 to 16th January 2024.

## SURVEYOR EXPERIENCE

3.26 Philip Ames BSc (Hons) is a Full Member of the Chartered Institute of Ecological and Environmental Management (CIEEM), has over 16 years of experience of bat survey and is registered to use the level 2 class survey licence for bats (class licence reference: 2015-11445-CLS-CLS).

3.27 Laragh Smyth BSc (Hons) has over 7 years bat survey experience, 4 years of surveying bats in hibernation and is registered to use the Level 1 Natural England class survey licence for bats (class licence reference: 2020-49436-CLS-CLS).

3.28 Laragh Smyth, Philip Ames, Jack Bage, Davey Monk, Jaimé Turner, Nikki Stapleton, and Louise Gower conducted the 2023 swarming survey visits.

3.29 Laragh Smyth, Philip Ames, Jack Bage, Jaimé Turner, and Louise Gower conducted the 2024 summer emergence survey visits.

3.30 All survey visits for each survey type were led by Laragh Smyth and Philip Ames.

## ASSESSMENT AND EVALUATION

3.31 BCT (2023) and the Bat Workers Manual (JNCC, 2004) have been used to: -

- Assess the suitability of the tunnels for roosting bats; and,
- Inform the scope of survey works required to assess whether bats are using the tunnels to roost.

3.32 Natural England standing advice (undated), which is a material consideration in planning, also provides details on standard survey methodology and factors that can influence survey effort.

3.33 The *Guidelines for Ecological Impact Assessment* (CIEEM, 2018) were used as guidance to determine the ecological importance of the site for bats.

## SURVEY LIMITATIONS

3.34 A cursory inspection of the cracks on the external cliff wall was made during the winter hibernation visits, however, due to the friability of the substrate and the dense vegetation along some sections, this was limited to around the entrances of the tunnel at surveyor height only.

3.35 The autumn swarming surveys were completed in late October and mid-November which is outside of the peak survey period for swarming bats (August to October). As such, the conclusions of the survey are not suitable for determining the absence of swarming activity at the site.

3.36 Static monitoring will only record bat passes from calling bats and due to coverage, due to the limitations of static detector monitoring, it was also not possible to determine if a bat was passing through or roosting within the tunnels.

3.37 During the winter hibernation survey, the use of static detectors was stopped after the December visit due to one of the static monitoring units being vandalised. Since it was not possible to secure units safely on site additional physical inspections were used to supplement the data.

3.38 When bats could not be accurately identified to species level, the word 'likely' has been used in front of the species name to recognise the degree of uncertainty. In these instances identification was based on visual characteristics, such as the size, flight pattern and emergence / re-entry time of the bat(s), as well as echolocation calls recorded by nearby surveyors shortly after the recorded bat emergence(s).

3.39 Myotis species cannot be easily and reliably differentiated by call during acoustic field work or via sound analysis and have therefore been identified as 'myotis species' which can include alcathoe bat (*Myotis alcathoe*), Bechstein's bat (*M. bechsteinii*), Brandt's bat (*M. brandtii*), Daubenton's bat (*M. daubentonii*), Natterer's bat (*M. nattereri*) and whiskered bat (*M. mystacinus*).

3.40 Brown long-eared bat (*Plecotus auritus*) can be difficult to record in the field. The calls of this species can be quiet and hard to detect. This species can also forage without calling. It is also a 'later emerging' species (BCT, 2016), which means that these species may be under-recorded during Static monitoring.

3.41 In spite of these minor limitations, this report provides a robust assessment of the site's importance for bats, the objectives of the report have been fulfilled and there are no ecologically significant limitations to the effectiveness of the survey conducted.

## LIFESPAN OF SURVEY DATA

3.42 Because bat roosts have been recorded on site (within all three tunnels), dependent on the time that elapses between: 1. grant of planning permission (and discharge of any relevant ecology-

related planning conditions) and 2. commencement of the proposed works, an update bat emergence / re-entry may be required to inform the EPS mitigation licence application. Natural England almost always require survey data recorded in the survey period that immediately precedes the submission of the licence application. In addition, the licence application cannot normally be submitted sooner than three months before the first licensable action would occur. These requirements often mean that a post-planning update survey is required to inform the EPS licence application to Natural England.

# 4. RESULTS

## DESK STUDY

4.1 A search of the MAGIC website identified nine approved bat EPSM licence within a 5km radius of the application site.

4.2 The closest search result evidences the presence of a non-breeding roost of common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), brown long-eared bat and Daubenton's bat *c.*50m north of the application site in the period 2021 to 2031.

4.3 Other species recorded within the search results include: Natterer's bat, Brandt's bat, whiskered bat and serotine (*Eptesicus serotinus*).

4.4 No maternity or hibernation roosts were returned within the search results.

## INITIAL ASSESSMENT

4.5 An initial assessment was conducted on 19th October 2023. During this first pre-survey inspection, three bats were recorded roosting within Tunnel 1 comprising two soprano pipistrelles and one brown long-eared bat. One unidentified bat was found in Tunnel 2 (likely *Pipistrellus* sp.) and no bats were recorded in Tunnel 3.

4.6 Good numbers of mosquitoes (likely *Culex* sp.) and herald moths (*Scoliopteryx libatrix*) were found in Tunnel 3, indicating suitable hibernation conditions for bats, herald moths were also recorded in Tunnel 1 though in less numbers.

4.7 All tunnels provide suitable material (chalk) for free-hanging hibernation or day-roosting.

4.8 All tunnels were assessed as being high suitability for roosting bats. It is unlikely that the tunnels would be used as a maternity roost due to the varying climatic conditions within the tunnels and PRFs present are unlikely to provide enough space for a maternity colony.

4.9 Cracks on the external cliff face are of low suitability for hibernating bats given the unstable climatic conditions. Only features around the entrances of the tunnels at surveyor height were examined.

### *TUNNEL 1 (SOUTHERN TUNNEL)*

4.10 There are approximately 25 roosting features present within Tunnel 1, comprising crevices behind rock-bolts (*c.*2-3m above ground), bat boxes, gaps behind wooden boards, crevices in the ceiling (*c.*5-6m above ground) and the chalk substrate of the ceiling allows for free-hanging hibernation.

4.11 The tunnel is semi-closed at the eastern end by a large spoil heap which partially stabilises the internal climate of the tunnel by reducing air movement, which increases its suitability for roosting or hibernating bats.

### *TUNNEL 2 (NORTHERN TUNNEL)*

4.12 There are approximately 15 roosting features present within Tunnel 2, comprising the same roosting features as Tunnel 1.

4.13 The tunnel has a small spoil heap at the eastern end which provides much less of a wind break for this tunnel compared with the larger heap in Tunnel 1. This makes the internal climate of Tunnel 2 comparatively less stable for roosting or hibernating bats depending on the external weather conditions.

### *TUNNEL 3 (CONVEYOR TUNNEL)*

4.14 There are limited features available for roosting bats. There are gaps/crevices in the earth spoil at the eastern end of the tunnel and wooden boards have been attached to the tunnel's interior (concrete and metal) however these boards are likely too close to the existing tunnel walls for bats to utilise them as a roosting feature.

4.15 The tunnel is closed in by earth on the eastern end which makes the internal climate stable but warmer than the other two tunnels.

## AUTUMN SWARMING SURVEY

4.16 Two swarming surveys were conducted on 31st October 2023 and 6th November 2023. The results of these surveys are shown in the table below.

4.17 Five species of bat were recorded on site, including common pipistrelle, soprano pipistrelle, brown long-eared bat, Daubenton's bat and a further myotis species (likely Natterer's bat).

*Table 2 Summary of data obtained during the swarming survey visits in October / November 2023.*

| Date | Survey type | Tunnel 1 recorded species | Tunnel 2 recorded species | Tunnel 3 recorded species |
|---|---|---|---|---|
| 31/10/2023 | Swarming survey | • Common pipistrelle<br>• Soprano pipistrelle<br>• Brown long-eared bat | • Common pipistrelle<br>• Soprano pipistrelle<br>• Brown long-eared bat<br>• Myotis sp. (likely Daubenton's bat)<br>• Myotis sp. (likely Natterer's bat) | • Common pipistrelle (in distance)<br>• Brown long-eared bat |
| 06/11/2023 | Swarming survey | • Common pipistrelle,<br>• Myotis sp. (likely Daubenton's bat) | • Common pipistrelle (2-3 bats),<br>• Brown long-eared bat (2-3 bats),<br>• Daubenton's bat) | • None |

### *SWARMING SURVEY 31.10.2023*

**Tunnel 1 (South)**

4.18 Near constant activity of common pipistrelle (minimum of 2 individual bats) throughout the survey with frequent activity of brown long-eared bat and occasional activity by soprano pipistrelle (2-3 individual bats). A myotis species of bat (likely Daubenton's bat) was also recorded.

4.19 Bats were recorded flying through the tunnel, entering and exiting through both the western and eastern arches. Social calls by pipistrelle bats were recorded throughout the survey.

**Tunnel 2 (North)**

4.20 Constant activity by common pipistrelle and soprano pipistrelle bats at the western entrance with occasional passes by brown long-eared bat and a short (5-7minute constant activity) by a myotis bat (likely Daubenton's) at the eastern entrance.

4.21 Bats were recorded flying through the tunnel, pipistrelles recorded entering and exiting through the western arch. Two soprano pipistrelle bats were recorded circling and social calls by both pipistrelle species were recorded throughout the survey.

**Tunnel 3 (Conveyor)**

4.22 No bats observed entering the tunnel - very low activity recorded and most calls were distant (likely foraging over the adjacent waterbody).

4.23 Distant recording of a common pipistrelle and brown long-eared bat.

### *SWARMING SURVEY ON 06.11.2023*

**Tunnel 1 (South)**

4.24 Low activity throughout the survey with occasional unseen passes of common pipistrelle, brown long-eared bat and a myotis species (likely Daubenton's bat).

**Tunnel 2 (North)**

4.25 Constant activity of common pipistrelle (2-3 individual bats) throughout the survey with frequent activity of brown long-eared (2-3 individual bats).

4.26 Bats recorded flying through the tunnel, entering and exiting through the western arch only. Touch and go behaviour recorded by both species with brown long-eared bat observed entering one of the bat boxes within the tunnel.

**Tunnel 3 (Conveyor)**

4.27 No bats were recorded.

## STATIC MONITORING SURVEYS

### *STATIC SWARMING SURVEYS*

4.28 A static detector was left out for five nights between 31st October 2023 and 4th November 2023. A summary of the results is provided in the table below.

4.29 No data was recorded for Tunnel 1 due to an error from the static recorder.

4.30 Five species were recorded using the site: common pipistrelle, soprano pipistrelle, brown long-eared bat and myotis species (Natterer's and Daubenton's bats).

4.31 Data recorded on 3rd November 2023 recorded the greatest number of calls within the survey period (*c*.680 passes of common pipistrelle) - it is possible that swarming by pipistrelle bats occurred on this evening.

4.32 Low numbers of brown long-eared bat and myotis species were recorded during the monitoring period, it is unlikely that swarming by these species occurred during this time period.

4.33 Table 3 below provides a summary of the static monitoring results across the three tunnels.

*Table 3 Summary of data obtained during the static monitoring (swarming data).*

| Date(s) | Tunnel | #calls per Species | | | | | | Notes |
|---|---|---|---|---|---|---|---|---|
| | | *P. pipistrellus* | *P. pygmaeus* | *Plecotus auritus* | *Myotis nattereri* | *Myotis daubentonii* | *Myotis* sp. | |
| 31/10/2023 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | No Data |
| | 2 | 108 | 0 | 0 | | | 10 | |
| | 3 | 12 | 1 | 0 | | | 0 | |
| 01/11/2023 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | No Data |
| | 2 | 139 | 0 | 4 | | | 9 | |
| | 3 | 5 | 4 | 0 | | | 1 | |
| 02/11/2023 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | No Data |
| | 2 | 1 | 0 | 1 | | | 0 | |
| | 3 | 0 | 0 | 0 | | | 0 | |
| 03/11/2023 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | No Data |
| | 2 | 681 | 1 | 1 | | | 5 | |
| | 3 | 33 | 42 | 0 | | | 2 | |
| 04/11/2023 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | No Data |
| | 2 | 8 | 0 | 3 | | | 9 | |
| | 3 | 6 | 12 | 0 | | | 2 | |

### *STATIC HIBERNATION SURVEYS*

4.34 No bat calls were recorded during the monitoring period across December.

## HIBERNATION SURVEY

4.35 Hibernation survey visits were conducted on four dates. The results of these survey visits are shown in the table below.

4.36 A peak count of eight hibernating bats was recorded across the three tunnels on 16th January 2024 and 6th February 2024.

4.37 Four species of bat were recorded using the site for hibernation: common pipistrelle, soprano pipistrelle, brown long-eared bat, and Natterer's bat.

4.38 A plan showing the location of the hibernating bats can be seen on the *Bat Survey Results* plan in Appendix 2.

*Table 4 Summary of data obtained during the four hibernation survey visits between 22/12/2023 and 26/02/2024.*

| Date | Tunnel | Species | | | | Weather |
|---|---|---|---|---|---|---|
| | | *P. pipistrellus* | *P. pygmaeus* | *Plecotus auritus* | *Myotis nattereri* | |
| 22/12/2023 | 1 | 1 | 1 | 2 | 1 | External temperature 11 degrees no internal temperature or humidity recordings. |
| | 2 | 0 | 0 | 0 | 0 | N/A as above |
| | 3 | 0 | 0 | 0 | 0 | N/A as above |
| 16/01/2024 | 1 | 6 | 0 | 1 | 0 | External temperature 3 degrees no internal temperature or humidity recordings. |
| | 2 | 0 | 0 | 0 | 0 | N/A as above |
| | 3 | 0 | 0 | 0 | 1 | N/A as above |
| 06/02/2024 | 1 | 4 | 0 | 2 | 0 | Temp: 13°C Humidity: 54% |
| | 2 | 2 | 0 | 0 | 0 | Temp: 12°C Humidity: 56% |
| | 3 | 0 | 0 | 0 | 0 | Temp: 12°C Humidity: 58% |
| 26/02/2024 | 1 | 4 | 0 | 1 | 0 | Temp: 8°C Humidity: 55% |
| | 2 | 1 | 0 | 0 | 0 | Temp: 7°C Humidity: 58% |
| | 3 | 0 | 0 | 0 | 0 | Temp: 11°C Humidity: 51% |

### *TUNNEL 1 (SOUTHERN TUNNEL)*

4.39 Tunnel 1 contained the greatest accumulation of hibernating bats, with three species recorded across the winter months including common pipistrelle, brown long-eared bat and Natterer's bat.

4.40 A peak count of six common pipistrelle bats were recorded hibernating on 16th January 2024. Between 1-2 brown long-eared bats were recorded across the visits.

### *TUNNEL 2 (NORTHERN TUNNEL)*

4.41 One species of bat was recorded using Tunnel 2 for hibernation; common pipistrelle. No other bat species was found hibernating in the tunnel.

4.42 The *Bat Survey Results Plan* (Appendix 2) also shows presence of a Myotis sp. bat within Tunnel 2. This bat was recorded in mid-October, shortly before the hibernation period. Therefore, whilst no direct evidence of Myotis hibernation was recorded in Tunnel 2 during the hibernation checks, it is possible that a Myotis sp. hibernates within Tunnel 2.

### *TUNNEL 3 (CONVEYOR TUNNEL)*

4.43 Only a single hibernating bat, a Natterer's bat, was recorded using Tunnel 3, on 16th January 2024.

## SUMMER EMERGENCE SURVEY

4.44 A plan showing the location of the summer roosting bats can be seen on the *Bat Survey Results* plan in Appendix 2.

### *TUNNEL 1 (SOUTHERN TUNNEL)*

4.45 Five species of bat were recorded using Tunnel 1: common pipistrelle, soprano pipistrelle, brown long-eared bat, natterer's bat and myotis bats (likely Daubenton's bat).

4.46 Three brown long-eared bats were recorded using the bat boxes within Tunnel 1 to day roost on 6th June 2024. No other species were recorded roosting.

4.47 A minimum of 10 individual bats (estimated to be three brown long-eared bats, five individual *myotis* bats and two common pipistrelle bats) were recorded using Tunnel 1 to socialise, groom and forage. Touch and go behaviour was displayed towards the eastern arch.

*Table 5 Summary of emergence survey results for Tunnel 1*

| Date of survey visit | Bat emergence observed? | Summary of bat activity |
|---|---|---|
| 14/05/2024 | No | The first bat, common pipistrelle, was recorded flying into this tunnel from the western arch at 21:13, 30 minutes after sunset.<br>Common pipistrelle, brown long-eared bat and a myotis species (likely Daubenton's bat) were recorded using the tunnel to forage and pass through. |

| Date of survey visit | Bat emergence observed? | Summary of bat activity |
|---|---|---|
| 06/06/2024 | Yes | The first bat, brown long-eared bat, was recorded emerging from bat box inside the tunnel at 21:29, 18 minutes after sunset. A second brown long-eared bat emerged from the same bat box at 21:21. A third brown long-eared bat emerged from a different bat box at 21:40, 29 minutes after sunset.<br>Common pipistrelle, brown long-eared and myotis species of bat were recorded using the tunnel. It is likely that these bats entered the tunnel from the surrounding habitats.<br>10 individual bats were recorded at any one point (estimated to be three brown long-eared bats, five myotis species of bat and two common pipistrelle bats).<br>These bats were recorded socialising and grooming within the tunnel throughout the survey period. Touch and go behaviour was observed towards the eastern arch. |
| 27/06/2024 | No | The first bats recorded at each of the tunnels were common pipistrelle. Although the timings for these encounters was within the expected emergence period of the species (between 30 minutes before to 30 after sunset).<br>Regular activity was seen by a low number of bats, with a maximum total of five at any one time (recorded in tunnel 1).<br>Social behaviour on the roof of the tunnel was recorded periodically throughout the survey. |

### *TUNNEL 2 (NORTHERN TUNNEL)*

4.48 Three species of bat were recorded using Tunnel 2: common pipistrelle, brown long-eared bat and myotis bats.

4.49 No bats were recorded emerging or roosting within Tunnel 2. Bats were observed passing through the tunnel and foraging.

*Table 6 Summary of emergence survey results for Tunnel 2.*

| Date of survey visit | Bat emergence observed? | Summary of bat activity |
|---|---|---|
| 14/05/2024 | No | The first bat, common pipistrelle, was recorded flying into this tunnel from the eastern arch at 21:10, 27 minutes after sunset.<br>Common pipistrelle, brown long-eared bat and a myotis species were recorded using the tunnel to forage and pass through. |
| 06/06/2024 | No | The first bat, common pipistrelle, was recorded at 21:28, 17 minutes after sunset.<br>Regular activity by common pipistrelle and brown long-eared bat. |
| 27/06/2024 | No | The first bat, common pipistrelle, was recorded at 21:37, 17 minutes after sunset.<br>Regular activity from 2-3 bats through out the survey. |

### *TUNNEL 3 (CONVERYOR TUNNEL)*

4.50 Two species of bat were recorded using Tunnel 3: common pipistrelle and soprano pipistrelle bats.

4.51 No bats were recorded emerging from or using Tunnel 3. All bats were recorded foraging in the adjacent surrounding habitats.

*Table 7 Summary of emergence survey results for Tunnel 3*

| Date of survey visit | Bat emergence observed? | Summary of bat activity |
|---|---|---|
| 14/05/2024 | No | The first bat, common pipistrelle, was recorded near Tunnel 3 at 21:10, 27 minutes after sunset.<br>Foraging was recorded outside the tunnel along the woodland and across the adjacent waterbody.<br>Common pipistrelle and soprano pipistrelle were recorded within the area but were not using the tunnel. |
| 06/06/2024 | No | The first bat, common pipistrelle, was recorded near Tunnel 3 at 22:10, 59 minutes after sunset. No other species were recorded. No bats recorded using the tunnel. |

## 5. PHOTOGRAPHS

*Photo 1 View of Tunnel 1 from western arch - eastern arch is almost closed off by spoil heap.*

*Photo 2 View of Tunnel 2 from western arch - eastern arch is mostly open with minor spoil heap at its entrance.*

*Photo 3 View of Tunnel 3 from eastern end (fully closed).*

*Photo 4 Photo of Natterer's bat in Tunnel 3 during the hibernation survey 16/01/2024*

*Photo 5* *10 bats (indicated by yellow dot) using Tunnel 1 during the emergence survey on 06/06/2024. Bats hanging on ceiling to rest, groom and socialise. Bats also recorded flying through the tunnel.*

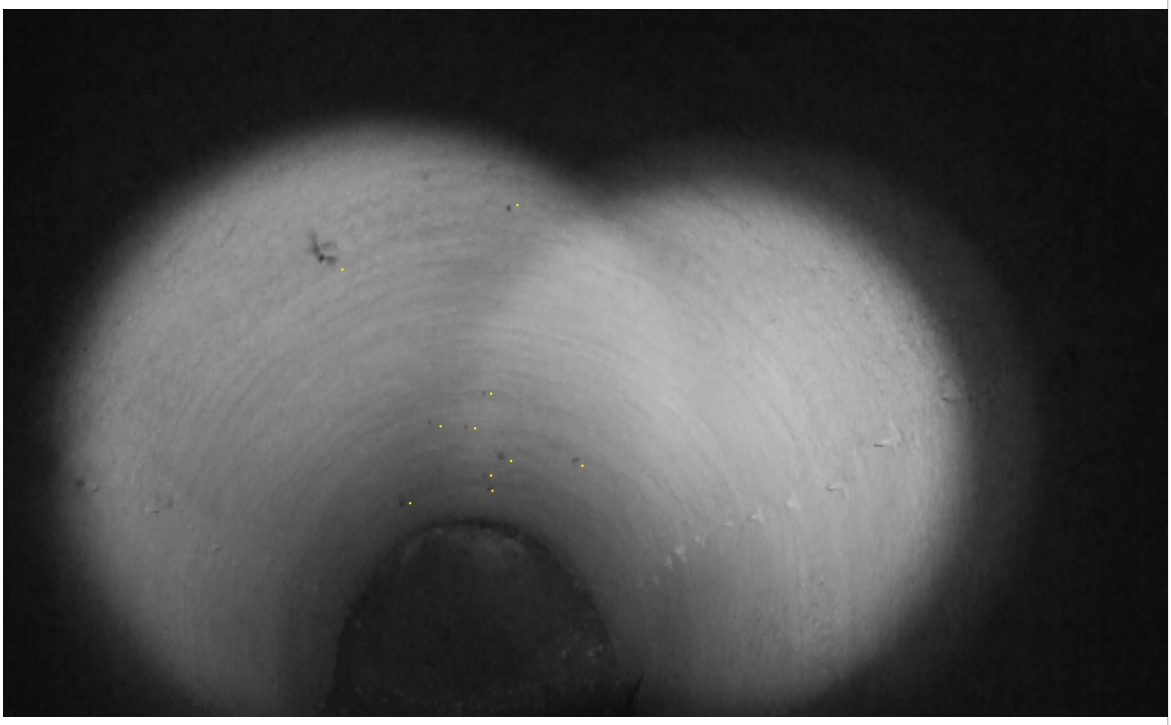

*Photo 6* *Photo of brown long-eared emergence from a bat box in Tunnel 1 during emergence survey on 06/06/2024*

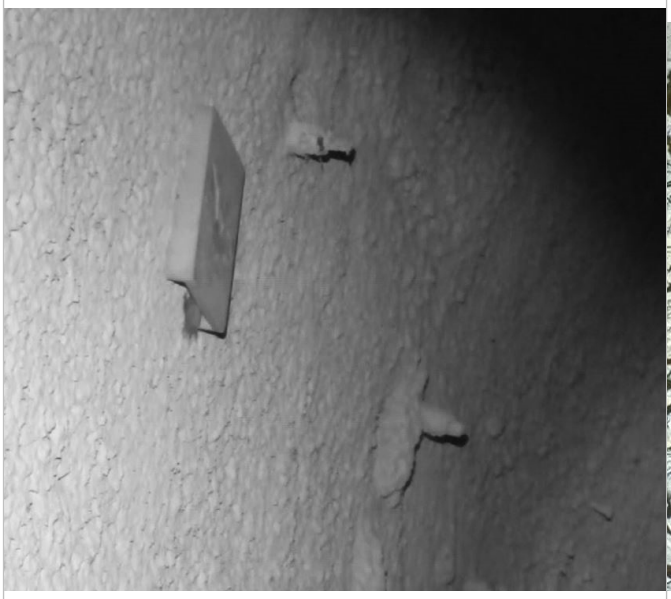

*Photo 7* *Photo of common pipistrelle bat hibernating in rock-bolt 31 on 16/01/2024 and 06/02/2024.*

# 6. EVALUATION AND RECOMMENDATIONS

6.1 Of the three tunnels on site, Tunnel 1 is the most utilised by bats during winter hibernation and summer roosting. Tunnel 1 offers additional roosting features and a more stable climate compared to the other tunnels.

## EVALUATION

### *AUTUMN SWARMING*

6.2 Five species were recorded using the site including; common pipistrelle, soprano pipistrelle, brown long-eared bat and myotis species (Daubenton's bat and natterers bat).

6.3 Swarming surveys had low numbers of bats using Tunnel 1 and 2, with no bats using Tunnel 3. Swarming did not occur during the survey visits.

6.4 Static data recorded on the 03.11.23 resulted in the greatest number of calls (*c*.680 passes of common pipistrelle) within the static survey period (October to November). It is possible that swarming by pipistrelle bats occurred on this evening.

6.5 Low numbers of brown long-eared bat and myotis species were recorded during the monitoring period, it is unlikely that swarming by these species occurred during this time period.

### *WINTER HIBERNATION*

6.6 A greater number of species and abundance was found when compared to the 2019 survey.

6.7 All three tunnels were found to support hibernating bats.

6.8 The highest number of bats found during the survey at any one time was eight individuals in January and February 2024.

6.9 A minimum of four species of bat were recorded hibernating across all three tunnels; common pipistrelle, soprano pipistrelle, brown long-eared bat and Natterer's bat.

6.10 Tunnel 1 recorded the highest numbers of roosting bats on every survey visit.

6.11 The variation in the numbers, position and species found are not likely to be significant given that on each of the survey dates, bats were not found to be in deep torpor and so expected to move between survey dates.

### *SUMMER ROOSTING*

6.12 Brown long-eared bats were recorded roosting in bat boxes within Tunnel 1 during the 2024 emergence surveys. No bats were recorded roosting within Tunnel 2 or 3.

6.13 Five species of bat were recorded using Tunnels 1 and 2 to socialise and forage including: common pipistrelle, brown long-eared bat, likely Daubenton's bat and Natterers bat. No bats were recorded entering or using Tunnel 3. Soprano pipistrelle was recorded in the wider landscape and may also use the tunnels.

6.14 In some instances, bats displayed ‘touch and go’ behaviour. This typically indicates where bats are looking to return to their roost or are checking out potential new roost locations. In isolation, this behaviour does not definitively prove that a roost is present in the relevant locations, but it does indicate a risk of roost presence at the time of survey or in the future. Therefore, bats may be roosting in locations within the tunnel that were recorded during the survey.

## ASSESSMENT OF IMPORTANCE

6.15 Common and soprano pipistrelle and brown long-eared bats are relatively common and widespread within Kent and across the UK, with Daubenton's and Natterers bat also being two of the more frequently encountered myotis species within Kent (Kent Bat Group, 2018). However, given the rarity of known hibernation roost locations and the numbers of bats encountered, the tunnels taken together are assessed as being of county level importance for bats.

## ZONE OF INFLUENCE

6.16 With regards to bats, the ZoI of the proposed development may to extend to *c.*15km from the application site boundary. This estimated ZoI is based on the average distance of the species using the site for hibernation bats often traveling tens of kilometres or more to reach suitable hibernation sites. Given that visual estimates of bats within hibernation sites typically underestimate the number of animals present, often by wide margins, the actual total number of bats using the tunnels is likely to be higher. A recent study by Krivek *et al*, in Animal Conservation, Jan 2023, found discrepancies of between 3 and 88% total counts from those seen visually and those recorded entering the hibernation site.

6.17 The proposed development will result in the destruction of one hibernation site supporting a maximum estimate of 24 bats (on the estimate that only a third of the maximum number of bats using the site were detected). Given that the bats using the site can be from different roosts, the effects of the loss of the hibernation site would impact on more than one bat colony.

6.18 In the absence of mitigation and compensation, the proposed development would result in loss of existing summer and hibernation roosts and could result in the killing, injuring and/or disturbance of roosting bats. Lighting and noise associated with the proposed development could also result in adverse effects upon roosting and foraging bats.

6.19 If the avoidance, mitigation, compensation and enhancement measures set out in the associated Ecological Impact Assessment report are effectively implemented, the ZoI of the proposed development in relation to ecologically significant adverse effects upon bats is likely to be limited to the application site.

## RECOMMENDATIONS

6.20 The implementation of an appropriate method statement and mitigation measures, as detailed within a EPSML application, will ensure that there is no adverse impact upon the favourable conservation status of local bat populations.

6.21 An EPSML will be required to facilitate development as roosting bats were found in all three of the tunnels during the completed survey works.

6.22 A licence cannot be obtained until full planning permission has been granted with all relevant wildlife conditions discharged.

6.23 No works affecting any of the three tunnels or immediate surroundings should be commenced until the bat EPSML has been secured from Natural England.

6.24 Once the EPSML has been granted, works affecting the tunnels will need to be undertaken in accordance with the conditions of the granted licence.

6.25 All three of the tunnels have seen modifications (bat boxes and boards) installed to improve their suitability for roosting bats. As none of the boards were found to be used, we would recommend that any further enhancements centre around both the provision of additional boxes, including a

mixture of wooden and woodcrete boxes, while also seeking to secure the tunnels from human disturbance either through landscaping to extend the waterbodies or provision of grates to bar off the tunnel entrances.

6.26 If tunnel 2 is retained, this tunnel would benefit from the partial concealment of the eastern entrance to increase humidity and control airflow (currently very draughty); this in conjunction with screening and additional boxes would expect to see higher use of the tunnel by bats during hibernation.

## 7. REFERENCES

Bat Conservation Trust (BCT) (2024 (Collins, 2023)) *Bat surveys for Professional Ecologists: Good Practice Guidelines*. 4th edition. BCT, London.

CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1 (Updated September 2019). Chartered Institute of Ecology and Environmental Management, Winchester.

Froidevaux, J. S. P., Boughey, K.L., Hawkins, C.L., Jones, G. & Collins, J. (2020) Evaluating survey methods for bat roost detection in ecological impact assessment. Animal Conservation 23 597–606. Accessed via: https://zslpublications.onlinelibrary.wiley.com/doi/epdf/10.1111/acv.12574 [Accessed 3/07/2024].

Joint Nature Conservation Committee (JNCC) (2004). Bat Workers' Manual. 3rd edition.

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Mitchell-Jones, A.J. (2004) *Bat Mitigation Guidelines.* English Nature, Peterborough.

Natural England (undated). *Standing Advice Species Sheet: Bats*

Ove Arup & Partners ltd. (2019). Kent County Council Bean Road Tunnels Bat Hibernation Survey Report. London: ARUP.

## APPENDIX 1: LEGISLATION AND PLANNING POLICY

7.1 The Conservation of Habitats and Species Regulations 2017 (as amended) and the Wildlife and Countryside Act 1981 (as amended) afford legal protection to bats.

7.2 The specific legal protection afforded to bats can be found within the Sections and Schedules of the relevant legislation and relevant case law.

7.3 In general, any person and/or activity that: -

- Damages or destroys a breeding or resting place of bats. (This is sometimes referred to as the strict liability or absolute offence);
- Deliberately captures, injures or kills a bat/s;
- Deliberately disturbs bats in a way likely to impair animals' ability to survive, breed or nurture young, their ability to hibernate and migrate and disturbance likely to have a significant effect on local distribution and abundance;
- Intentionally or recklessly disturbs a bat/s while occupying a structure or place used for shelter and/or protection (Wildlife and Countryside Act 1981 (as amended)); and
- Intentionally or recklessly obstructs access to any structure or place that bat / bats use for shelter or protection (Wildlife and Countryside Act 1981 (as amended)).

…may be guilty of an offence.

7.4 The legislation applies to bat roosts even when they are not occupied.

7.5 Actions affecting multiple animals can be construed as separate offences and therefore penalties can be applied per animal impacted.

7.6 Under certain circumstances licences can be granted by the Statutory Nature Conservation Organisation (Natural England in England) to permit actions that would otherwise be unlawful.

7.7 There are some very specific defences associated with the Conservation of Habitats and Species Regulations 2017 (as amended), however these are unlikely to apply to construction related projects. The Sections of the Regulations provide further details of these defences.

7.8 The Wildlife and Countryside Act (1981) includes defence for those aspects of the legislation that apply to bats. These defences are unlikely to apply to construction related projects and do not apply to those acts included in the Conservation of Habitats and Species Regulations 2017 (as amended). The Schedules of the Act provide further details of defences.

7.9 Local authorities have obligations under sections 40 and 41 of the Natural Environment and Rural Communities Act (NERC) 2006 to have regard to the purpose of conserving biodiversity in carrying out their duties. Seven species of bat species are listed on Section 41 the NERC Act.

## APPENDIX 2: SURVEY RESULTS PLANS

**[See Overleaf]**

## Tunnel 2

CP: 1 no.
CP: 1 no.
CP: 1 no.

RB05 RB10 RB15 RB20 RB25 RB30 RB35 RB40 RB45

Edge of spoil heap

RB05 RB10 RB15 RB20 RB25 RB30 RB35 RB40 RB45

CP: 1 no.
CP: 1 no.
MYO.sp: 1 no.

## Tunnel 1

CP: 2 no.
BLE: 1 no.
UID: 1 no.
SP: 1 no.
CP: 1 no.

BLE: 1 no.
BLE: 1 no.
BLE: 1 no.
CP: 1 no.
CP: 2 no.
CP: 2 no.

RB05 RB10 RB15 RB20 RB25 RB30 RB35 RB40 RB45

Edge of spoil heap

P.sp: 1 no.
CP: 1 no.

CP: 1 no.
CP: 1 no.

RB05 RB10 RB15 RB20 RB25 RB30 RB35 RB40 RB45

SP: 1 no.
NAT: 1 no.
BLE: 1 no.
CP: 1 no.
BLE: 1 no.
CP: 1 no.

## Tunnel 3

NAT: 1 no.

**LEGEND:**

**Roost Features:**

- Potential bat roosting feature
- Existing bat box
- Existing wooden plank

**Recorded Activity:**

- Bat recorded during 19/10/2023 walkover survey
- Bat recorded during survey date 22/12/2023
- Bat recorded during survey date 16/01/2024
- Bat recorded during survey date 06/02/2024
- Bat recorded during survey date 26/02/2024

**Species:**

BLE: Brown long-eared bat *(Plecotus auritus)*

CP: Common pipistrelle *(Pipistrellus pipistrellus)*

MYO.sp: Unidentified myotis species *(Myotis sp.)*

NAT: Natterer's bat *(Myotis nattereri)*

P.sp: Unidentified pipistrelle species *(Pipistrellus sp.)*

SP: Soprano pipistrelle *(Pipistrellus pygmaeus)*

UID: Unidentified species

Indicative site boundary

0 3 6 m
1:300

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| rev. | rev. date | auth. | rev. note |
|---|---|---|---|
| P01 | 05/07/24 | PA | Initial issue. |
| P02 | 12/07/24 | PA | Minor amendment. |

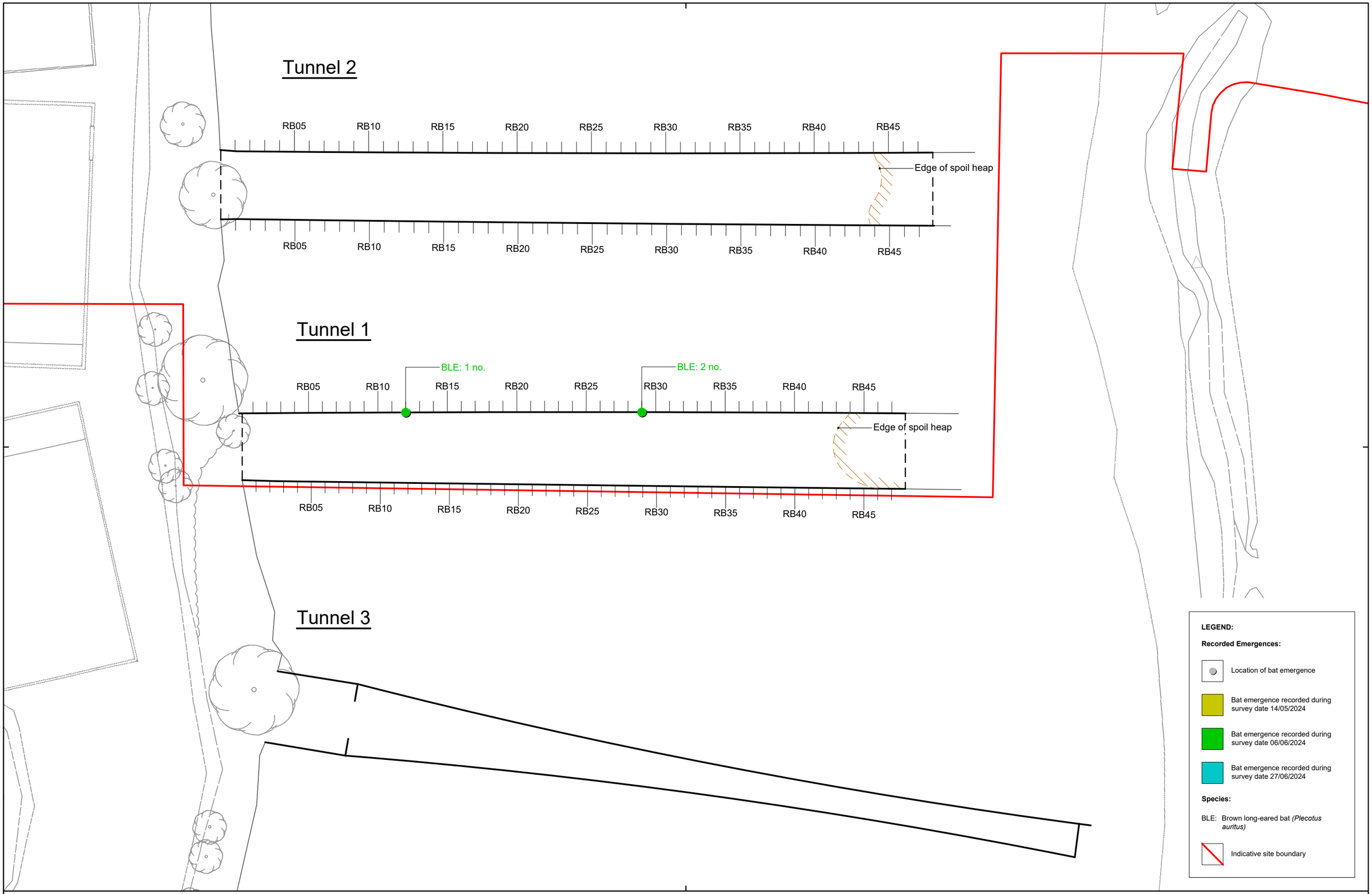
rev. rev. date auth. rev. note

client. **Arcadis LLP**
project. **Bean Tunnel, Kent (Arcadis)**
**Bluewater**
**Kent**

drawing no. **6511-LLB-XX-XX-DR-Ec-0001** rev. **P02**
drawing title. **Bat Survey Results Plan**
**Hibernation Survey**
suit. **S4**

rev date. **12/07/24**
scale. **1:200**
sheet. **A3**
drawn. **DM**
checked. **PA**

lloydbore landscape ecology arboriculture
33 ST. GEORGE'S PLACE, CANTERBURY, KENT CT1 1UT 01227464340
www.lloydbore.co.uk mail@lloydbore.co.uk




**LEGEND:**

**Recorded Emergences:**

- Location of bat emergence
- Bat emergence recorded during survey date 14/05/2024
- Bat emergence recorded during survey date 06/06/2024
- Bat emergence recorded during survey date 27/06/2024

**Species:**

BLE: Brown long-eared bat *(Plecotus auritus)*

- Indicative site boundary

0 3 6 m

1:300

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| rev. | rev. date | auth. | rev. note |
|---|---|---|---|
| P01 | 05/07/24 | PA | Initial issue. |

| rev. | rev. date | auth. | rev. note |
|---|---|---|---|

client. *Arcadis LLP*

project. *Bean Tunnel, Kent (Arcadis)*
*Bluewater*
*Kent*

drawing no. *6511-LLB-XX-XX-DR-Ec-0002* rev. *P01*

drawing title. *Bat Survey Results Plan*
*Emergence Survey*

suit. *S4*

rev date. *05/07/24*
scale. *1:200*
sheet. *A3*
drawn. *DM*
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33 ST. GEORGE'S PLACE, CANTERBURY, KENT CT1 1UT 01227464340
www.lloydbore.co.uk mail@lloydbore.co.uk

## APPENDIX 3: INFRA-RED ILLUMINATION (END SURVEY TIMES)

*Photo 8 Tunnel 1 - Position 1A - Start*

*Photo 9 Tunnel 1 - Position 1A - End*

*Photo 10 Tunnel 1 - Position 1B - Start*

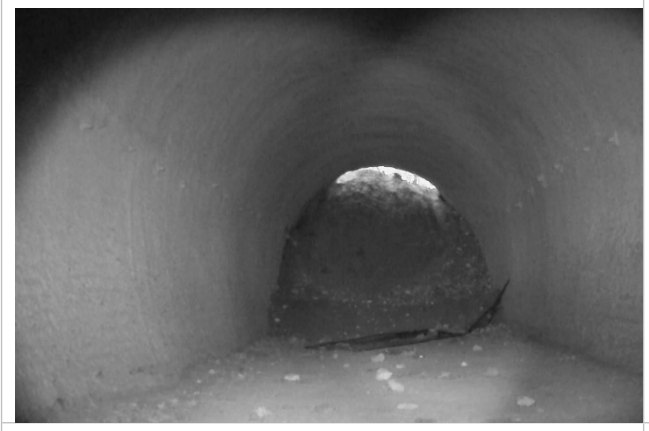

*Photo 11 Tunnel 1 - Position 1B - End*

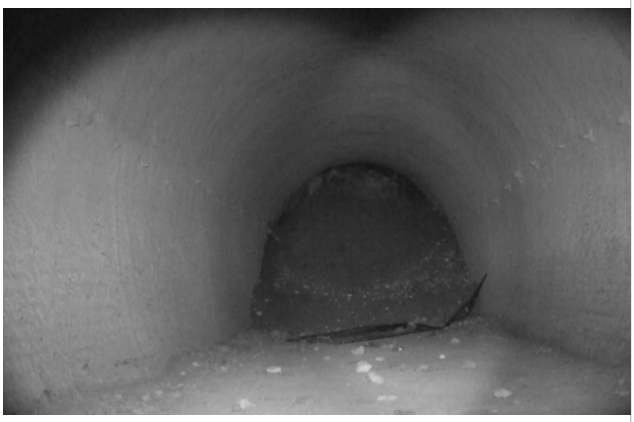

*Photo 12 Tunnel 2 - Position 2A - Start*

*Photo 13 Tunnel 2 - Position 2B - End*

*Photo 14 Tunnel 2 - Position 2B - Start*

*Photo 15 Tunnel 2 - Position 2B - End*

*Photo 16 Tunnel 3 - Position 3 - Start*

*Photo 17 Tunnel 3 - Position 3 - End*